



MEMORANDUM

DATE January 29 1996 5400 1

TO LE Woods Environmental Protection/Ecology, T130C, X3378

FROM T R Ryon, Ecology, T130B, X3657

SUBJECT FINAL REPORT DELIVERY OF THE STUDY RESULTS OF DAM TOE SLOPE SAND/ROCK BLANKET INSTALLATION EFFECTS ON THE PREBLE'S MEADOW JUMPING MOUSE-TRR-003-96

Attached is the final report on the Study Results of the Dam Toe Slope Sand/Rock Blanket Installation Effects on the Preble's Meadow Jumping Mouse. All DOE comments including those comments from the Environmental Liaison Group and DOE Legal Department have been resolved in this report.

Results presented here show little measurable impact from construction activities immediately adjacent to Preble's meadow jumping mouse habitat. Other construction activities adjacent to mouse habitat probably will not pose threats to mouse populations. These results do not suggest that further studies for construction projects adjacent to Preble's meadow jumping mouse habitat are warranted.

I appreciate the time and effort DOE and Kaiser-Hill personnel expended on this report. Your comments made this a better product.

TRR trr

Attachment
Study Results of the Dam Toe Slope Sand/Rock Blanket Installation Effects on the Preble's Meadow Jumping Mouse

cc
C S Evans
J D Krause
File
ERPD Records (2)

ADMIN RECD

A-0003-000563

**STUDY RESULTS OF
DAM TOE SLOPE SAND/ROCK
BLANKET INSTALLATION EFFECTS
ON THE
PREBLE'S MEADOW JUMPING MOUSE**

**Rocky Flats Field Office
U S Department of Energy
Golden, CO**

January 29, 1996

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STUDY RESULTS OF DAM TOE SLOPE SAND/ROCK BLANKET INSTALLATION EFFECTS ON THE PREBLE'S MEADOW JUMPING MOUSE

MANAGEMENT OVERVIEW

The Preble's meadow jumping mouse is the only subspecies of meadow jumping mouse known to occur along the Colorado Front Range. It is known to exist in only five locations in Colorado. The Preble's meadow jumping mouse habitat in the Rocky Flats Environmental Technology Site Buffer Zone is along stream channels and pond margins of all three major drainages. The Biodiversity Legal Foundation has petitioned the U S Fish and Wildlife Service to list the Preble's meadow jumping mouse as a threatened or endangered species under the Endangered Species Act. A final decision on whether to list it as an endangered or threatened species has not been made.

Installation of sand/rock blankets on several dams was recommended by the U S Army Corps of Engineers, the Federal Energy Regulatory Commission, and the Colorado State Engineer, to improve dam stability and reduce the potential for dam failure. Dam failure could impact downstream areas including areas inhabited by Preble's meadow jumping mouse populations. The recommended dam maintenance activities could also impact Preble's meadow jumping mouse populations, but any impacts would likely be restricted to the vicinity of the dam toes.

U S Fish and Wildlife Service representatives visited the proposed construction sites to evaluate potential impacts to the Preble's meadow jumping mouse. The Department of Energy, Rocky Flats Field Office, agreed to do a study designed to evaluate the impacts of dam toe sand/rock blanket installations on Preble's meadow jumping mouse populations. This is documented in a letter to the U S Fish and Wildlife Service, dated May 10, 1995.

This study evaluated potential impacts by trapping (i.e., capturing and releasing) small mammals to determine the presence or absence of the Preble's meadow jumping mouse, marking captured mice with fluorescent powder attempting to locate their burrows, and monitoring noise levels generated by equipment during construction. Vegetation at successful trap sites was identified to provide additional information on the habitat that the Preble's meadow jumping mouse prefers. Trapping was conducted both before and after construction to determine whether the project caused Preble's meadow jumping mice to leave the area, or whether the project had any other identifiable effects on the population. The most intensive trapping efforts took place at the Pond B-4 dam.

Trapping was conducted according to a previously approved Dam Toe Slope Sand/Rock Blanket Field Sampling Plan and according to the U S Fish and Wildlife Service's Interim Guidelines for Preble's Meadow Jumping Mouse Surveys.

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Modifications to the trapping methods were also made, at the request of the U S Fish and Wildlife Service, after trapping had started

A total of nine Preble's meadow jumping mice were trapped during the three weeks prior to construction, and four were trapped during one week after construction. The capture rate for juveniles was similar before and after construction. Post-construction captures were, on the average, closer to the construction site than pre-construction captures. Adult mice apparently went into hibernation prior to construction, since none were captured after the first week of trapping.

Study results do not indicate that the installation of the dam toe sand/rock blanket at the B-4 dam had a significant effect on the Preble's meadow jumping mouse population in the vicinity of the project. There was no indication that Preble's meadow jumping mice left the area as a result of the construction activities, or that they moved further away from the construction.

Future dam toe project activities, conducted under similar conditions, would be expected to have comparable impacts to adjacent Mouse populations and adjacent suitable habitat. Additional studies performed for similar projects would not be expected to provide significant additional information.

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STUDY RESULTS OF DAM TOE SLOPE SAND/ROCK BLANKET INSTALLATION EFFECTS ON THE PREBLE'S MEADOW JUMPING MOUSE

1 0 INTRODUCTION

The Ecology staff of Rocky Mountain Remediation Services (RMRS), under an agreement between the Department of Energy Rocky Flats Field Office (DOE/RFFO) and the U S Fish and Wildlife Service Denver Field Office (FWS/DFO), conducted a monitoring study for the Dam Toe Slope Sand/Rock Blanket Project at the Rocky Flats Environmental Technology Site (Site). This study was conducted from 31 May to 20 June, 1995 (under EG&G) and 29 August to 29 September, 1995 and included trapping (i.e., capturing and releasing of small mammals) at the B-2 and B-4 ponds.

DOE/RFFO worked in conjunction with FWS/DFO to create the Dam Toe Slope Sand/Rock Blanket Study Field Sampling Plan (Plan) (EG&G, April 1994) which was designed to assess potential impacts to Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Mouse) populations. Methodologies were further refined in light of the U S Fish and Wildlife Service's Interim Guidelines for Preble's Meadow Jumping Mouse Surveys issued 10 May, 1995. Additional changes in trapping methods and additional requests were incorporated (see Methods section) resulting in a study that went well beyond the original requests made by FWS/DFO representatives.

The Dam Toe Slope Sand/Rock Blanket Study provides information useful in describing a small disturbance adjacent to Mouse habitat. This information may prove useful to the FWS/DFO as a comparison to future projects with similar disturbances which have the potential to affect Mouse habitat.

The purpose of the Plan was to monitor Mouse populations before, during, and after construction of the sand/rock blanket at the B-4 dam once initial presence or absence trapping was completed at both the B-2 and B-4 dam sites. Although there is only marginal habitat in the area surrounding the B-2 dam, DOE/RFFO and FWS/DFO agreed that a minimal trapping effort should be conducted to document presence or absence of the Mouse prior to sand/rock blanket construction. If no Mouse captures occurred around the B-2 dam, no more trapping or habitat characterization would be required at this location.

The objective of this study was to assess the impacts of the dam toe blanket installation on the Mouse. The objective was met by collecting pre-construction and post-construction trapping data in four landscape zones and recording noise levels during construction. Assumptions made in the Plan were:

- That the Mouse would be captured in sufficient numbers to detect movements before, during, and after the installation of the blanket.

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- That the stockpiling of materials during construction would not create an additional disturbance by covering burrows or nests
- That all individuals would have emerged from hibernation by the time construction began. Conversely, the project should finish prior to the time when the Mice began increasing their fat reserves for hibernation. This period typically begins in mid-August extending into September

Due to schedule changes, work on the toe blankets was not started in June as initially planned. Construction activities did not commence until September 19, 1995. Since no Mice were captured around the B-2 dam during May/June trapping, study efforts were focused at the B-4 dam area only. This study area was located at the margins of and downstream from the fourth of the five B-series ponds (B-4 Pond) located in the South Walnut Creek drainage. South Walnut Creek begins within the Site Industrial Area and runs in a northeasterly direction until its confluence with Walnut Creek. Walnut Creek then flows east and eventually flows offsite at Indiana Avenue.

To detect possible migration of Mice away from the impacted site, the study area was divided into four landscape units. Figure 1 provides a graphic presentation of habitat types and trapping locations. The four units are:

- **The B-4 Pond Margin** This is an area that includes the mudflat pond margin, the rip-rap slope of the dam (east side of the pond), and shrub/cattail patches on the south and west sides of the pond. The area is approximately 1/3 of a hectare (3,000 m²).
- **The affected area below the B-4 dam** This is the area where the blanket was placed. This area is approximately 28 m² and supported a cattail patch, which became established in an area of dam seepage. Additionally, a 78 m² spoils area was included in this landscape unit. The spoils area formerly supported a variety of mesic grasses. The total area of this unit is 106 m².
- **The riparian area leading from the B-4 pond to the B-5 pond** This area is downstream from the affected area and contains a multi-strata vegetation community including a diversity of trees, shrubs, grassland, and wetland vegetation. The unit is linear in shape and extends about 253 m downstream from the affected area. This riparian area represents the most suitable Mouse habitat in the overall project area.
- **The grassland perimeter area** This is the mesic and reclaimed grassland area adjacent to both the riparian and the affected area. Therefore, the area is located north of the riparian unit and southeast from the affected area. This area was selected to support the premise

that the Mouse might migrate away from the disturbance and subsequently be captured in this area

Presence of the Mouse was documented again during the initial August/September live-trapping by establishing a simple, linear trap line through suitable habitat below the B-4 dam. To better characterize Mouse movement, however, the subsequent trapping effort incorporated a trapping grid that included all landscape units below the dam (Figure 2). This grid aided in documenting animal movements within and between landscape units with the prior assumption that individuals would be captured multiple times.

1.1 Need for the Dam Toe Blankets

The installation of sand/rock blankets on Site dam slopes is not a regulatory requirement, yet has been recommended by the Army Corps of Engineers, the Federal Energy Regulatory Commission, and the Colorado State Engineer to ensure dam safety. Dam toe drains are a standard method used to drain embankments of dams that hold water for extended periods of time, and are designed to reduce the potential for dam failure. Dams recommended for sand/rock blankets by the regulators include A-1 and A-2 in the A-series ponds, B-2, B-3, and B-4 in the B-series ponds, and C-1 in the Woman Creek drainage (C-series ponds). Dams B-2 and B-4 were selected for sand/rock blanket installation first, because the condition of these dams was most questionable. Specifically, dams B-2 and B-4 were increased in size by about one third in 1972. Down stream buttresses with drains were installed with the intention of containing water in these ponds for long periods of time. Prior to these upgrades, no improvements or maintenance had occurred after the time of original construction, B-2 in 1953 and B-4 prior to 1953. Upon further consideration by DOE/RFFO, a sand/rock blanket at the C-1 dam will not be installed. No decision has been made on the remaining dams.

Saturated dam toes and embankments can lead to slumping of the dam slope face. The purpose of the sand/rock blanket is to "pick up" the seepage and carry it in a controlled fashion to an acceptable point of discharge away from the dam toe. The transported seepage can then be inspected to ensure that it is clear and free of fine particles indicative of dam erosion.

The presence of fines in seepage would indicate that piping is occurring and there could be an imminent threat to dam safety. In addition to allowing for drainage of water from the toe of the dam and inspection of seepage, the blanket adds stability by acting as a ballast against slumping of the dam slope face. These features add stability to the dam by helping counteract uplift pressures in the dam. Vegetation such as cattails or willow do not offer the same stabilizing qualities.

The installation of a sand/rock blanket would impact a smaller area when compared to

the damage to downstream habitat caused by a dam failure. Additionally, potential Individual Hazardous Substance Site (IHSS) impacts and environmental, legal and political issues may arise if a dam failure should occur. This may include potential transport of contaminated sediments, loss of Mouse habitat, and loss of wetlands.

1.2 Preble's Meadow Jumping Mouse Status and Background

Zapus hudsonius preblei is a member of the family Zapodidae and is the only subspecies of meadow jumping mouse known to the Front Range of Colorado. The historical range of the Mouse extended into eight Front Range counties and also extended into Wyoming. Today, only four locations from four counties in Colorado are known to contain Mouse populations. The Rocky Flats Environmental Technology Site Buffer Zone (Buffer Zone) is one such location.

Meadow jumping mice are one of few true mammalian hibernators exhibiting relatively long inactive periods. They hibernate during late fall and winter. A significant weight increase can be observed prior to the hibernation period. Mice apparently breed soon after emerging from hibernation and typically have two to three litters per year. An average of five young per litter is expected as reported from four studies (Whitaker 1972). Meadow jumping mice are omnivorous, eating seeds, fruit, insects, and fungi (Whitaker 1972).

Krutzsch (1954) indicated that the Mouse most often occurs in moist habitats and Whitaker (1963) reported that *Z. hudsonius* requires adequate herbaceous ground cover to maintain populations. There have been few studies concerning the community requirements of *Z. hudsonius* in Colorado, except studies in the Buffer Zone. These studies identify "shrubby riparian vegetation" (EG&G 1993) and willow shrub communities (EG&G 1992) as likely *Z. hudsonius* habitat. Both studies point to a strong affinity for willow (*Salix* sp.). Mouse habitat characterization under the Site's ecological monitoring program indicated the Mouse prefer "areas near streams which have *Salix exigua* and *Symphoricarpos occidentalis* and are not discouraged by the presence of weeds such as Canada thistle (*Cirsium arvense*) and Japanese brome (*Bromus japonicus*)" (DOE 1995). Additionally, capture sites in the Buffer Zone tend to be in riparian areas of relatively unbroken vegetation with multiple strata vegetation.

The U.S. Fish and Wildlife Service (Service) was petitioned by the Biodiversity Legal Foundation in August 1994 to list the Mouse as a threatened or endangered species. The petition contained a claim of a decline in the Mouse population due to habitat destruction through real estate development, grazing, and water diversions. The Service responded that the petition has merit and a decision whether to initiate the listing process is forthcoming. Any action on formally listing the species awaits congressional reauthorization of the Endangered Species Act, and budgetary authorization.

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In response to the regulatory status and concern for the Mouse, DOE/RFFO has sponsored and continues to support Preble's meadow jumping mouse monitoring. Examples are the ongoing "Investigations of the Ecology and Ethology of the Preble's Meadow Jumping Mouse" through the Colorado School of Mines Environmental Institute at Rocky Flats and applied ecological monitoring by RMRS personnel. Information from this study proved useful in interpreting results of the Dam Toe Slope Sand/Rock Blanket Study (see Discussion section).

1 3 Agency Contacts

DOE/RFFO initially contacted FWS/DFO in early January 1995 with concerns that the Mouse may be adversely affected by sand/rock blanket installations. DOE/RFFO was seeking guidance to lessen any potential impact to Mouse populations. On 26 January, 1995, a FWS/DFO representative was given a tour of all the dams which required sand/rock blanket installations. A second tour was given on 8 March, 1995 after project planning and engineering was finalized. Based on comments and requests from the FWS/DFO representative, DOE/RFFO Site Support and FWS/DFO agreed on a format and content of a monitoring study directed toward the sand/rock blanket projects. The Dam Toe Slope Sand/Rock Blanket Study was finalized and transmitted to FWS/DFO on 24 April, 1995. Due to a change in subcontractors and the reduction in budgets, the Dam Toe Slope Sand/Rock Blanket Study did not begin until 29 August, 1995. See Appendix A for a complete chronological history file.

2 0 MONITORING METHODOLOGY (METHODS)

Two scientific hypotheses were stated in the Plan:

- 1 The Mouse will be present before and after the impact in the area disturbed (affected area)
- 2 Movement patterns will be altered in response to the disturbance as compared to baseline. Baseline refers to suggestions that the Mouse is reluctant to cross barriers such as roads, upland or sparsely vegetated areas (i.e., baseline behavior). A divergence from baseline would indicate that construction activities may have forced the Mouse to cross barriers not normally crossed. To answer this question, three of the surrounding landscape units were included: riparian area, grassland area, and pond margin.

2 1 Trapping

Trapping took place during a two phase effort in four landscape units in which Longworth style live-traps were used. The first phase was the May/June trapping at B-2 and B-4 and the second was in August/September at the B-4 dam only. Phase two trapping and habitat characterization was planned for the B-4 dam regardless of phase one trapping results. B-2 trapping was scheduled to occur only during the phase one effort unless presence of the Mouse was documented. A specific trapping arrangement was used to confirm the presence of the Mouse in the B-4 study area during phase one and initially during phase two trapping (Figure 1)

- Pond Margin - 25 traps were placed along the shrub and cattail patches in about five meter intervals (Z95-39B)
- Affected Area - 25 traps were placed parallel to the dam slope in reclaimed and mesic grassland at five meter intervals. The trap layout was inclusive of the blanket and spoils pile area (Z95-40B)
- Riparian Area - 50 traps were placed in two lines parallel to the creek edge starting at the bottom of the spillway for 125 meters on either side (Z95-41B)

The above arrangement of traps were used during the May/June and early August/September trapping. Once the presence of the Mouse was confirmed during the beginning of phase two trapping, the trap lines were rearranged on a 100 by 100 meter grid (Figure 2). This grid was placed in the area downstream of the dam slope and was inclusive of the riparian and affected area landscape units. This new arrangement enabled biologists to better track the movements of recaptured Mice.

When traps were rearranged to fit the new grid, traps in the affected area were relocated along the grid points and were removed during construction of the toe blanket. Traps in the riparian area remained in the same location, but were simply established as a location on the grid. Additionally, traps were placed in parallel rows moving north and south away from the riparian area, into the adjacent grassland area. In this manner, trapping locations in the fourth landscape unit, perimeter grassland, were established.

Each small mammal capture was identified to species, age, and sex. Additionally, all characteristic morphological measurements were recorded for Mouse captures. These measurements included head and body length, ear length, tail length, right hind foot length, and body mass. All data were recorded on approved field data sheets and entered into the Ecological Monitoring Program Data Base. Additional information, such as weather conditions, were recorded as well.

Traps were cleaned periodically to increase the chance of capturing the Mouse. Once more common species, such as the meadow vole (*Microtus pennsylvanicus*), become aware of certain trap locations, individuals may become "trap-happy" and be captured in the trap every night. Experience indicates that the Mouse is unlikely to be captured in such a trap due to 1) the odor left in the trap by the other rodent or 2) the other rodent setting off the trap and rendering the trap unavailable to the Mouse.

Trapping methods were altered to conform to the new FWS/DFO Interim Survey Guidelines for Preble's Meadow Jumping Mouse, completed 7 June, 1995. The Plan was completed in April, 1995. Methods in the plan that were superseded by the Interim Survey Guidelines were 1) no pre-baiting of traps and 2) a change of bait material to omolene (sweet oats).

2.2 Habitat Characterization

Habitat characterization was done from 3 - 13 October, 1995 in the B-4 dam area. Twelve capture locations and 12 randomly chosen non-capture locations were sampled. A 3 m radius circle was delineated with the trap site as the center for each sample location. All plant species rooted within the circle, were identified and scientific name, species code, and phenological state, were recorded on field data sheets. In addition, tallies were made for each of the woody stem and cactus species. Other information collected on a separate data sheet for each sample location included:

- Identification and visual cover estimates of the four major habitat types within the circle
- Visual estimates of tree canopy and shrub canopy cover, foliar cover, and ground cover within the circle
- Visual estimates of the basal cover categories: graminoid cover, forb cover, shrub cover, and rock and litter cover within the circle
- Distance to continuous canopy edge, identification of the canopy species, and whether the trap location was in or out of the canopy
- Slope and aspect measurements, moisture level estimates, burrowing opportunity estimates, and slope position of the sample location
- Distance to stream and nearest embankment measurements

Data were entered into the database and proofread for accuracy. Any corrections necessary were made and proofread again prior to using the database for data analysis.

2.3 Additional Requests

On August 31, ecology staff engaged in Mouse trapping at the B-4 Pond dam slope were asked by DOE/RFFO to track Mice with fluorescent powder dye. The request was initiated by FWS/DFO. The objective was to powder Mice then check the

affected area including the location of the blanket, the spoils pile, and the access area for burrows as indicated by fluorescent powder around the outside of a burrow

Three Mice were powdered, two red and one blue. The affected area was subsequently checked. Each location within the affected area was swept with a black light during pre-dawn hours, and the travel routes of the Mice marked for later evaluation.

3 0 RESULTS

Results for the Dam Toe Slope Sand/Rock Blanket Study are comprised of information on blanket construction details, small mammal information, and habitat characterization results. Construction details include a project description, equipment noise levels, and duration of various portions of the project. Small mammal information includes results from trapping and fluorescent dye tracking.

3 1 Construction Details

The sequence of sand/rock toe blanket installations was scheduled to accommodate the on-going Mouse monitoring study. Installation of the B-4 Dam blanket was performed first, due to the known presence of a Mouse population and the fact that the Mouse would soon be entering hibernation. Trapping in June (Table 1) at the B-2 dam blanket documented the absence of the Mouse at this project site. According to the agreement with FWS/DFO, no additional study was required at the B-2 dam.

3 1 1 Project Description

Access to the construction site at B-4 was limited to a single line of travel in and out of the area. This access route limited the disturbance to the vegetation within the work area. Due to wet weather and snow, all work was performed using a tracked hoe to prevent rutting of areas adjacent to the stream embankment.

The following sequence of steps was used during the construction of the sand/rock toe blanket at the B-4 dam:

- Eighteen inches of soil were removed from the predetermined blanket area using an excavator (track hoe)
- Spoils were placed up-slope adjacent to the excavation site within a predetermined and staked area
- The spoils pile was smoothed out to blend in with the contour of the land

- A porous geotextile blanket was laid in the excavated area and covered with a 9 inch layer of fine sand This sand is to act as a filter
- A second geotextile blanket was laid on top of the fine sand layer and covered with a 9 inch layer of coarse sand
- A final layer of 9 inch rip-rap (large rocks) were placed on top of the coarse sand layer

The disturbed areas surrounding the blanket and the access route were reclaimed by broadcasting a seed mixture then mulching with "weed-free" hay

3 1 2 Noise Levels

Noise levels from the tracked hoe were recorded by the RMRS Health and Safety Department using a decibel (dB) meter on the "A" scale from a distance of 10 meters The greatest noise levels were reached while the tracked hoe was in reverse and the OSHA backup alarm was engaged This maximum reading was 88.1 dB During normal operations such as forward movement and excavation, a maximum reading of 70.4 dB was recorded

3 1 3 Duration of the Project and Final Inspection

Although project activities began 13 September 1995, ground breaking did not occur until 19 September 1995 The blanket installation at B-4 lasted for four days from 19 September to 22 September, 1995 Heavy equipment was removed from the area on 22 September, but the tracked hoe was returned on 25 September for approximately one hour to scarify the temporary access road prior to reseeding After the afternoon of 25 September, foot traffic only occurred in the work area in order to broadcast seed (26 September) and mulch (27 September) disturbed areas The total duration of the project was from 19 September to 27 September The final on-site inspection for "Acceptance and Transfer" of the project was conducted on 13 October, 1995

3 2 Small Mammals

Small mammal trapping was conducted in two phases during 1995 A May/June trapping effort was conducted to document presence or absence of the Mouse at both the B-2 and B-4 dams in anticipation of a June construction start Construction was postponed until September Correspondingly, phase two trapping was delayed

3 2 1 Small Mammal Trapping

May/June trapping at the B-2 dam study area documented three species of small mammals over 150 trap-nights (Table 1) No Preble's meadow jumping mice were captured during this trapping effort

June trapping at the B-4 dam study area documented four species of small mammals over 500 trap-nights (Table 1) One Mouse was captured during this trapping effort

August/September trapping at the B-4 dam study area employed 1591 trap-nights A total of 592 small mammal individuals (37% success) were captured representing seven species during the entire five week trapping effort A number of traps (17%) were disturbed or otherwise closed and empty A total of 724 (46%) traps remained open and available Table 1 presents the trapping results partitioned into efforts for summer (B-2 and B-4) and prior to, during, and after construction of the sand/rock blanket within the four landscape units at the B-4 dam Overall, seven species of small mammals were captured during 1591 trap nights The highest species diversity was in the riparian area, where six species were captured Meadow voles were captured most often, followed by captures of prairie voles and deer mice Preble's meadow jumping mice were captured 13 times overall Table 2 presents detailed information on Mouse captures by week

The largest trapping effort was conducted prior to construction activities This was due to unforeseen delays in the construction schedule relating to awarding of a subcontract A total of 1026 trap-nights were logged across all landscape units over a three week period prior to construction activities The greatest trapping effort was conducted in the riparian area, as called for in the Plan

A total of nine Mice were captured in the riparian area during this three week effort with most of the captures (7) occurring during the first week No Mice were captured during the third week of trapping Of the nine *Z. h. preblei* captures, four were adults, four were juveniles, and one escaped before age could be determined One juvenile Mouse died during handling The closest Mouse capture to the affected area occurred 15 m away in the riparian landscape unit The average distance of captures from the affected area was 70 m No Mice were captured in any of the other landscape units

Trapping during construction was hampered by weather conditions Although construction occurred during the week of September 18, trapping activities were suspended after one day due to snow and cold temperatures, which poses the threat of the Mouse dying of exposure in a trap Consequently, only 96 trap-nights were logged and no Mice were captured during this week

Observations were made during construction to record any pertinent events or significant work practices Primarily, alterations to the stream channel were not

created. Additionally, Construction personnel restricted egress to a single lane of travel and restricted disturbance as much as possible. Staging of equipment and materials was conducted on the main road, away from Mouse habitat and the riparian area in general. Wet weather reduced dust as well as small mammal activity.

After construction activities were completed, six species were captured across all landscape units over 469 trap-nights. The greatest diversity came from the perimeter grasslands with six species, followed by the riparian area with five. The reason for the odd number of trap-nights is that traps had to be removed from the affected area during construction and could not be replaced until reseedling was completed on September 26, which was the second day of the last week of trapping.

Four Preble's meadow jumping mice were captured after construction activities. All were juveniles and all captures occurred in the riparian area. No Mice were captured in any other landscape unit. The closest Mouse capture to the affected area occurred 35 m away. The average distance from the affected area was 54 m. One individual, a juvenile female (#44), was captured before and after construction. The recapture occurred 40 m closer to the affected area than the original capture, which occurred prior to construction. This individual gained 10.1 grams between captures, as is expected during this time of year under normal conditions. Although fewer mice were captured during the post-construction period, a discussion of the study assumptions, and a closer look at the capture data is warranted (see Discussion Section).

3.2.2 Fluorescent Dye Tracking

The use of fluorescent dyes was employed to powder and track Mice caught near the affected area. Two Mice were powdered red on 1 September and one Mouse (#44) was powdered blue on 6 September. On 14 September, pre-dawn tracking was conducted. First, the affected area was swept with a black light to reveal any fluorescent dye. A blue trail was found along the perimeter of the cattail patch where the blanket was to be placed. The trail was followed until it terminated on the other side of the cattails. From this point, the remaining affected area was swept in search of a burrow with blue or red dye around the entrance. No burrows were located and no additional trails were found.

Second, the powdered Mouse that was captured closest to the affected area (red Mouse at 15 m) was tracked from the point of capture. This individual trail was tracked to be certain a second trail was not missed in sweeping the affected area. This mouse was captured on the north side of the stream channel. Most construction took place on the south side. Tracking of this individual revealed its movements during the initial period after release. This individual swam across the stream to the south side, climbed an embankment, rested in a thick willow patch for a short period, then jumped from the top of the embankment presumably to return to the other side of the stream channel. The trail was lost at this point.

3 3 Habitat Characterization

Successful and non-successful trap locations were characterized to allow comparison of habitats where Mice were captured and habitats where Mice were not captured

3 3 1 Successful Capture Location Results

A total of 59 plant species was recorded at the 12 successful capture locations, of which 64 percent were native plant species (Table 3). Three species, smooth brome (*Bromus inermis*), Canada thistle (*Cirsium arvense*), and snowberry (*Symphoricarpos occidentalis*), were found at all 12 successful locations. Fourteen species were found at only the successful locations (Table 3) and none of the 14 species occurred more than twice. Most of the species found at only the successful locations were plants adapted to wetter environments such as those found near streams or in marshes. Woody stem and cactus count totals for the successful locations revealed that snowberry, coyote willow (*Salix exigua*), and wild rose (*Rosa arkansana*) had the highest stem densities (Table 4). Only one species of cactus, prickly pear (*Opuntia humifusa*), was found at the successful locations. A total of eight habitat types were recorded at the successful locations (Table 5). Three of these were exclusive of the successful locations: wet meadow/marsh, tall marsh, and persistent stream. The habitat type with the greatest occurrence and highest percent average cover was reclaimed grassland. Reclaimed grassland is common in the area due to dam construction and stream channelization in the past. Bottomland shrub, short upland shrub, and deciduous woodland were the next most frequent habitat types recorded. Supplementary data gathered at each successful location sampled is presented in Table 6, with means and data summaries beneath the columns. These data will be compared with the non-successful locations in the discussion section.

3 3 2 Non-Successful Capture Location Results

A total of 73 plant species were recorded at the 12 non-successful capture locations, of which 70 percent were native plant species (Table 7). Only one species, smooth brome, occurred at all 12 non-successful locations. Twenty-seven species were recorded only at the non-successful locations and not at the successful locations (Table 7). Of these, 17 occurred at more than two sample locations. Most of the species restricted to the non-successful locations are plants commonly found in the mesic mixed grassland and xeric mixed grassland habitat types at the Site. Woody stem and cactus count totals for the non-successful locations revealed that snowberry, wild rose, and coyote willow, had the highest stem densities (Table 4). In addition, three species of cactus, prickly pear, nipple cactus (*Echinocereus viridiflorus*), and hedgehog cactus (*Coryphantha missouriensis*), were recorded at the non-successful locations. A total of eight habitat types were recorded at the non-successful locations (Table 5). Three of these were exclusive of the non-successful locations: tall upland shrub, annual grass/forb, and disturbed/barren land. The habitat type with the

greatest occurrence and highest percent average cover was reclaimed grassland. Short upland shrub, mesic mixed grassland, disturbed/barren land, and deciduous woodland were the next most frequent habitat types recorded. Supplementary data gathered at each successful location sampled is presented in Table 6, with means and data summaries beneath the columns.

4.0 DISCUSSION

4.1 Study Assumptions

The assumptions of the study as stated earlier in this report were met to the best of ecology staff abilities, given the way the assumptions were stated in the Plan and the circumstances surrounding trapping. Assumption 1 was met in that 13 Mice were captured. This is a relatively substantial number of captures compared to other Buffer Zone trapping conducted concurrently. Any discussion of movement however, is hampered by limited recaptures.

Assumption 2 was met by trapping the affected area (167 trap nights prior to and 38 trap nights after construction) and by conducting the fluorescent dye tracking in the affected area.

Assumption 3 was not met as written in the Plan. As was the case at other Buffer Zone areas trapped at this same period, adults disappeared after the first full week in September, presumably to begin hibernation. This fact was known due to research under the "Investigations of the Ecology and Ethology of the Preble's Meadow Jumping Mouse". However, this fact was addressed by conducting the fluorescent dye tracking in the affected area. The tracking provided documentation that powdered mice had not established burrows in the affected area. It was conjectured that any burrows found in this more mesic area would likely be hibernation burrows.

Hypothesis 1 was met in that the Mouse was captured before and after the disturbance. Admittedly, the captures were not in the affected area, but captures would not be expected in this area due to the lack of suitable habitat in the affected area, specifically. Within the suitable habitat, however, the Mouse was captured before and after the disturbance.

Hypothesis 2 was not met considering two types of trapping results. The Mouse was captured in the riparian landscape unit and movement within the unit did not indicate a negative affect on Mouse population. Additionally, no Mouse captures occurred in any other landscape unit. Therefore, movement patterns were not altered from baseline behavior.

4 2 Small Mammal Trapping

Trapping data (Tables 1 and 2) reveal the fact that no adult Mice were captured after the construction period. It is likely that the four adults, captured prior to construction activities, entered hibernation sometime in early September. Similar observations were noted at other areas in Walnut Creek (pers comm, Dr Fred Harrington). Given this observation, the capture of juvenile Mice (Table 2) was similar during week one (3 individuals) compared to week five (4 individuals).

Table 8 presents raw and adjusted data for the first week (week 1) of trapping prior to construction activities and the first week (week 5) after construction was completed. The raw data has been adjusted for both periods to 200 trap-nights on a proportional basis. Conversion to the same number of trap-nights for the periods before and after construction aids in trapping results comparisons. In making this conversion, it is noteworthy that Mouse captures would be equivalent for both periods. This is surprising, given that adults were likely in hibernation by week 5. One would expect the success rate of Mouse captures to be lower in the absence of the adult population. This fact indicates that juvenile capture rates were actually higher in the riparian area after construction. This comparison was made simply to reinforce the fact that the raw data of Mouse captures in the riparian area indicates that no adverse affect from construction activities was detected in the juvenile population.

4 3 Habitat Characterization

Successful capture locations for the Mouse showed a number of different characteristics as compared with the non-successful locations. Differences in the plant species recorded at the successful and non-successful locations revealed that those species recorded at only successful locations are typically riparian and marsh habitat species (Table 3). Those found only at the non-successful locations are those commonly found in the mesic mixed grasslands and xeric mixed grasslands in the Buffer Zone (Table 3). The only species which occurred at all 24 locations sampled was smooth brome. Canada thistle and snowberry, with 23 and 22 occurrences respectively, were the only other species prevalent at both successful and non-successful sites.

Successful locations generally had a more developed vertical stratification of plant species (herbaceous, shrub, and tree canopy layers) than the non-successful locations. Habitat type data (Tables 5 and 6) revealed a higher frequency of occurrence of the bottomland shrub, short upland shrub, and deciduous woodland habitat types at the successful locations as compared with the non-successful locations. In particular, the bottomland shrub habitat type, typified by coyote willow, had a much higher cover value and frequency in the successful locations than in the non-successful locations. This was also apparent in the woody stem and cactus density values (Table 4) which showed the successful locations to have over three

times the coyote willow stem density than the non-successful locations. Additionally, snowberry density was also approximately one-third greater at the successful locations than at the non-successful locations. In contrast, wild rose densities were approximately one-third greater at the non-successful locations than at the successful locations. These differences in shrub densities tend to suggest a hydrologic difference between the successful and non-successful locations because the coyote willow and snowberry tend to be found next to streams or in fairly moist habitat, whereas the wild rose is more commonly found in somewhat dryer mesic mixed grassland conditions, although often growing in association with coyote willow and snowberry patches. The growth habits of the three shrub species is also somewhat different creating different microhabitat conditions. Generally, the coyote willow and snowberry tend to grow larger, taller, and denser than the wild rose, creating a potentially cooler, more shaded, protected area. Seven out of twelve successful locations were found to occur in sites which possessed a multi-layered canopy. By comparison, only two out of twelve non-successful locations exhibited a multi-layered canopy (Table 6). Successful locations also had only one species of cactus present with an average total count of 34 individuals, whereas the non-successful locations had three species of cactus present with an average total count of 49 individuals (Table 4).

Comparison of the supplementary data gathered at the successful and non-successful locations (Table 6) revealed no apparent differences in ground and foliar cover, aspect, or moisture estimates. Successful locations have approximately twice the amount of shrub canopy cover as the non-successful locations. Although the tree canopy average cover values were no different between successful and non-successful locations, the frequency of tree cover was higher at the successful locations (seven) than at the non-successful locations (three, Table 6). This again indicates the preference for a multi-level canopy habitat. Litter amounts were generally higher at the successful locations than the non-successful locations. Burrowing opportunities were also more available at the successful locations than the non-successful locations. The overall geographic position of the successful locations in the valley were also different from the non-successful locations. Generally, successful locations were closer to the stream and to embankments, and on more, gentle slopes, near the valley bottom.

5 0 CONCLUSIONS

For this study, the habitat of the Preble's meadow jumping mouse is delineated by successful capture locations. These locations were all in the riparian landscape unit, on gentle slopes, close to stream channels, with moderate litter, and with moderate burrowing opportunities. Vegetation at successful capture locations was typically bottomland shrubs (*Salix exigua*) and herbaceous riparian plants. This is consistent with the findings of 1994 studies of Mouse habitat under the Ecological Monitoring Program. The Preble's meadow jumping mouse was reported to prefer "areas near streams which have *Salix exigua* and *Symphoricarpos occidentalis* and are not discouraged by the presence of weeds such as Canada thistle (*Cirsium arvense*) and Japanese brome (*Bromus japonicus*)" (DOE 1995). However, no definitive habitat description for the Preble's meadow jumping mouse exists to date.

The sand/rock blanket installation removed a small pure stand of cattails and disturbed some surrounding grasslands. FWS/DFO Interim Guidelines for Preble's Meadow Jumping Mouse Surveys states that pure stands of cattails are not typically associated with Preble's meadow jumping mouse habitat. Construction did not disturb the riparian corridor.

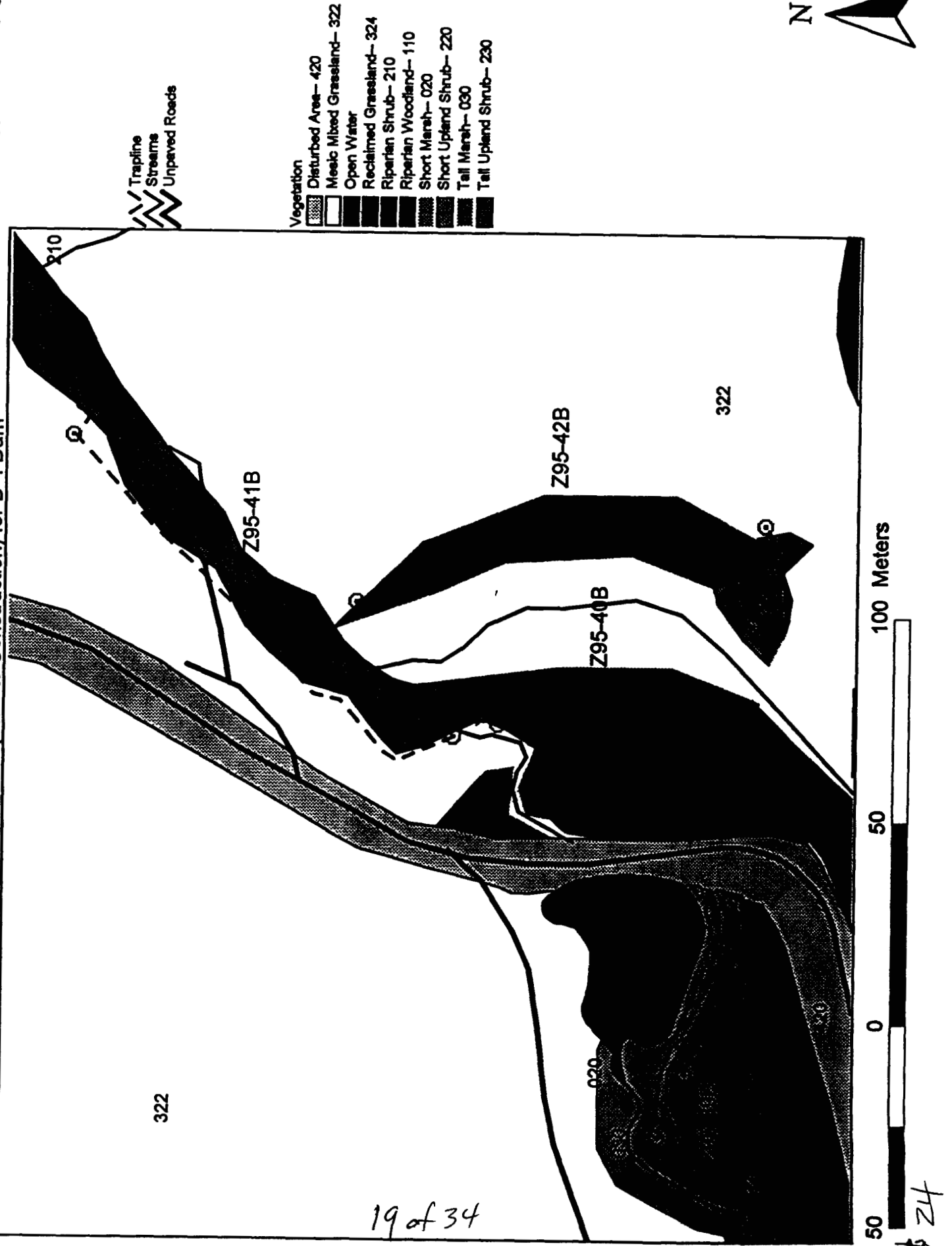
Juvenile Preble's meadow jumping mice were captured before and after construction in the riparian landscape unit. Adults were captured only before construction, probably because adult Preble's meadow jumping mice had entered hibernation before construction was completed. Capture rates for juveniles were similar both before and after construction. All captures occurred in the riparian landscape unit. No Preble's meadow jumping mice were captured in any other landscape units. Post-construction capture locations were closer on average to the construction site than pre-construction capture locations. The lack of captures in other landscape units does not prove that the Preble's meadow jumping mice did not emigrate from the riparian landscape unit. Conversely, this study does not indicate that the Preble's meadow jumping mice left the area as a result of the construction.

The B-4 dam sand/rock blanket project created a disturbance of approximately 3210 ft² adjacent to suitable Preble's meadow jumping mouse habitat. This disturbance included both the sand/rock blanket area and the temporary access road. The construction activities lasted for four days. There is no indication from this study that the B-4 dam Project had a significant effect on the Preble's meadow jumping mouse population. Dam toe sand/rock blanket installation projects in similar habitats such as the cattail patch adjacent to riparian woodland vegetation, would not be expected to significantly affect adjacent Preble's meadow jumping mouse populations.

6 0 LITERATURE CITED

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Figure 1 Vegetation Types and Trapline Locations (Prior to Construction) for B-4 Dam



Best Available Copy

Figure 2 Vegetation Types and Trap-Grid Location for B-4 Dam, with disturbance illustrated

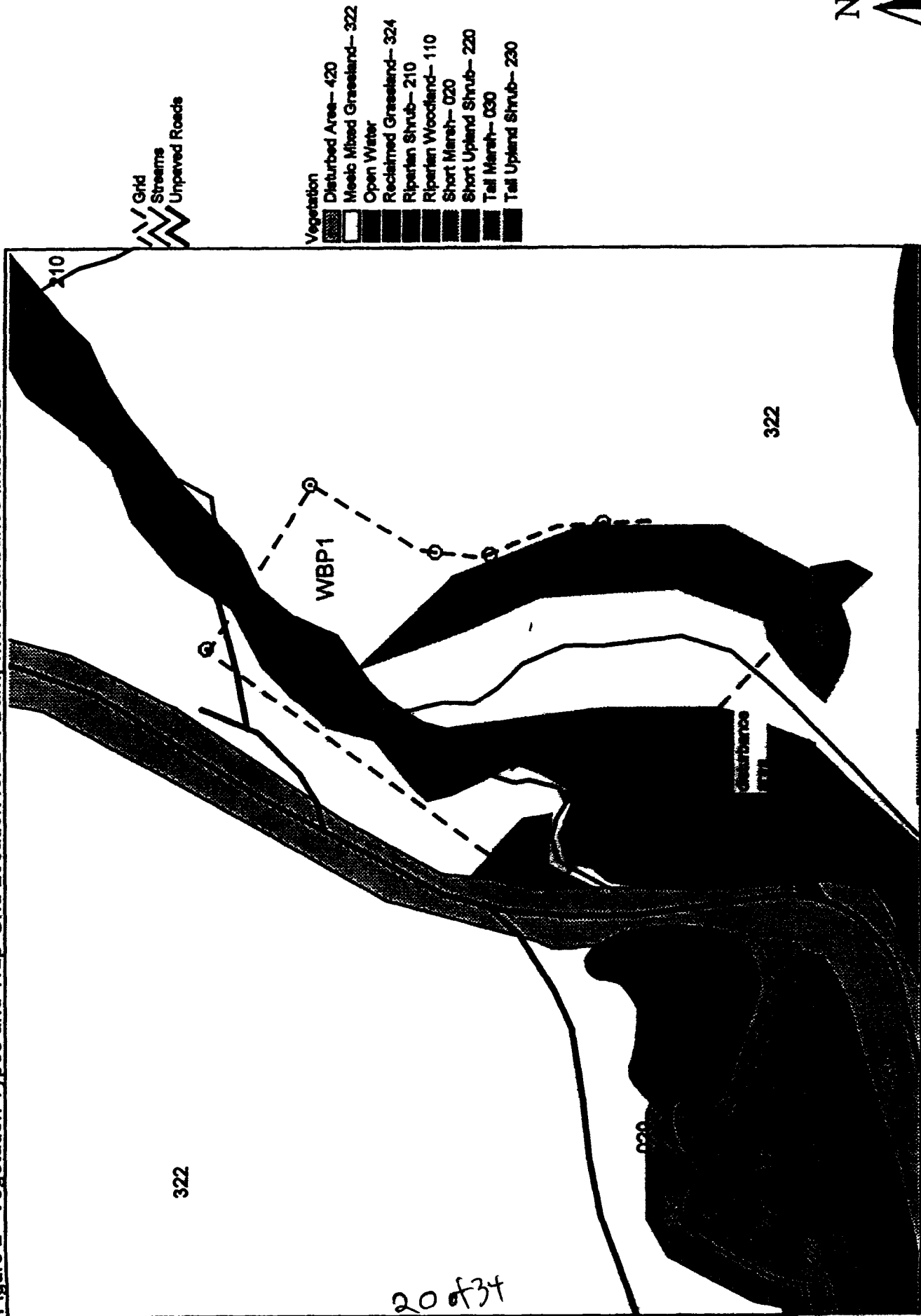


TABLE 1 SMALL MAMMAL TRAPPING RESULTS FOR PONDS B2 AND B4 DAM TOE SLOPE SAND/ROCK BLANKET PROJECT, 1995

	Initial/Summer				Pre-Construction				During Construction				Post-Construction			
	Dates		Dates		Dates		Dates		Dates		Dates		Dates		Dates	
	May 31 to June 8	June 13 to June 20	May 31 to June 8	June 13 to June 20	August 29 to September 15	September 19	September 19	September 19	September 19	September 19	September 19	September 19	September 19	September 19	September 19	September 19
	B 2 Dam	B 4 Dam	B 2 Dam	B 4 Dam	Affected Area	Riparian Area	Penmeter Grassland	Penmeter Grassland	Affected Area	Riparian Area	Penmeter Grassland	Penmeter Grassland	Pond Margin	Affected Area	Riparian Area	Penmeter Grassland
Trap Nights	150	500	150	500	167	564	145	145	5	44	47	47	75	38	176	180
Available Traps*	43	179	43	179	67	298	70	70	3	32	14	14	25	17	87	49
Percent Available	29	36	29	36	40	53	48	48	60	73	30	30	33	45	49	27
Species Richness	3	4	3	4	3	6	4	4	1	3	3	3	4	3	5	6
Species Captured																
<i>Reithrodontomys montanus</i>	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1
<i>Reithrodontomys megalotis</i>	NC	NC	NC	NC	NC	3	NC	NC	NC	NC	NC	NC	1	NC	NC	1
<i>Peromyscus maniculatus</i>	34	71	23	6	6	48	16	16	NC	1	5	5	7	2	14	17
<i>Neotoma mexicana</i>	NC	1	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
<i>Microtus pennsylvanicus</i>	2	NC	22	36	36	87	40	40	2	9	22	22	4	2	22	36
<i>Microtus ochrogaster</i>	22	59	6	7	7	41	16	16	NC	1	1	1	7	4	17	44
<i>Chaetodipus hispidus</i>	NC	NC	NC	NC	NC	1	1	1	NC	NC	NC	NC	NC	NC	1	5
<i>Zapus hudsonius</i>	NC	1	NC	NC	NC	9	NC	NC	NC	NC	NC	NC	NC	NC	4	NC

* Available traps were those traps remaining set and baited after a trap night
NC = Not Captured

Table 2 Preble's Meadow Jumping Mice (*Zapus hudsonius*) Captures in the Riparian Area, Sand/Rock Blanket Project, B-4 Pond Dam, 1995

SEX	Initial/Summer				Pre-Construction				During Construction				Post-Construction			
	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8	
	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	Juvenile
Male	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Female	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	4
Unknown	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

Table 3 Successful Locations Plant Species List

Scientific Name	Native	Occurrence	Frequency
Agropyron cristatum (L) Gaertn	N	2	0 17
Agropyron repens (L) Beauv	N	2	0 17
Agropyron smithii Rydb	Y	5	0 42
Agrostis stolonifera L	N	4	0 33
Ambrosia psilostachya DC	Y	8	0 67
Artemisia frigida Willd	Y	1	0 08
Artemisia ludoviciana Nutt	Y	2	0 17
Asclepias speciosa Torr	Y	6	0 5
Aster ericoides L	Y	6	0 5
Barbarea orthoceras Ledeb	N	4	0 33
Bromus inermis Leyss	N	12	1
Bromus japonicus Thunb ex Murr	N	5	0 42
Camelina microcarpa Andrz	N	1	0 08
Carduus nutans L	N	2	0 17
Ceratophyllum demersum L	Y	1	0 08
Chenopodium album L	N	2	0 17
Chrysopsis fulcrata Greene	Y	2	0 17
Chrysopsis villosa Pursh	Y	1	0 08
Cirsium arvense (L) Scop	N	12	1
Cynoglossum officinale L	N	1	0 08
Descurainia richardsonii (Sweet) Schultz	Y	1	0 08
Epilobium ciliatum Raf	Y	2	0 17
Festuca pratensis Huds	Y	1	0 08
Galium aparine L	Y	4	0 33
Glycyrrhiza lepidota Pursh	Y	4	0 33
Grindelia squarrosa (Pursh) Dun	Y	1	0 08
Gutierrezia sarothrae (Pursh) Britt. & Rusby	Y	1	0 08
Juncus balticus Willd	Y	1	0 08
Lathyrus eucosmus Butters and St John	Y	2	0 17
Linaria dalmatica (L) Mill	N	4	0 33
Linum perenne L var lewisii (Pursh) Eat & Wright	Y	3	0 25
Nepeta cataria L	N	4	0 33
Oenothera biennis L	Y	1	0 08
Onosmodium molle Michx	Y	1	0 08
Opuntia humifusa (Raf) Raf	Y	5	0 42
Penstemon secundiflorus Benth	Y	1	0 08
Phleum pratense L	N	1	0 08
Poa compressa L	N	1	0 08
Poa pratensis L	N	1	0 08
Polygonum convolvulus L	N	1	0 08
Populus deltoides Marsh var occidentalis Rydb	Y	3	0 25
Prunus virginiana L	Y	1	0 08
Psoralea tenuiflora Pursh	Y	1	0 08
Ribes odoratum Wendl	Y	1	0 08
Rosa arkansana Porter	Y	7	0 58

Frequency = # of occurrences/12

Highlighted scientific names are species only occurring at successful locations

Table 3 Successful Locations Plant Species List (cont.)

Scientific Name	Number of		
	Native	Occurrences	Frequency
Rumex crispus L	N	1	0 08
Rumex mexicanus Meisn	Y	1	0 08
Salix amygdaloides Anderss	Y	1	0 08
Salix exigua Nutt. ssp. interior (Rowlee) Cronq	Y	9	0 75
Scrophularia lanceolata Pursh	Y	1	0 08
Solidago missouriensis Nutt.	Y	7	0 58
Stipa viridula Trin	Y	1	0 08
Symphoricarpos occidentalis Hook	Y	12	1
Thlaspi arvense L.	N	1	0 08
Trifolium sp		1	0 08
Typha latifolia L.	Y	1	0 08
Ulmus pumila L.	N	1	0 08
Verbascum thapsus L.	N	4	0 33
Yucca glauca Nutt.	Y	2	0 17

Frequency = # of occurrences/12

Highlighted scientific names are species only occurring at successful locations

Data Summary of Successful Location Plant Species

species = 59

% native species = 64

of species found only at successful locations = 14

See highlighted scientific names for these individuals in the list.

Table 4 Woody Stem and Cactus Counts and Densities for Successful and Non-Successful Locations

Successful Locations

SCIENTIFIC NAME	NATIVE	TOTAL COUNT	DENSITY (STEMS/M2)
Symphoricarpos occidentalis Hook	Y	1915	5.64
Salix exigua Nutt ssp interior (Rowlee) Cronq	Y	842	2.48
Rosa arkansana Porter	Y	212	0.62
Opuntia humifusa (Raf) Raf	Y	11	0.03
Ribes odoratum Wendl	Y	11	0.03
Populus deltoides Marsh var occidentalis Rydb	Y	6	0.02
Prunus virginiana L	Y	4	0.01
Yucca glauca Nutt	Y	4	0.01
Salix amygdaloides Anderss	Y	1	0
Ulmus pumila L	N	1	0

Note The total count based on all locations (n=12)

Non-Successful Locations

SCIENTIFIC NAME	NATIVE	TOTAL COUNT	DENSITY (STEMS/M2)
Symphoricarpos occidentalis Hook	Y	1208	3.56
Rosa arkansana Porter	Y	335	0.99
Salix exigua Nutt ssp interior (Rowlee) Cronq	Y	251	0.74
Opuntia humifusa (Raf) Raf	Y	34	0.1
Prunus virginiana L	Y	14	0.04
Ribes odoratum Wendl	Y	10	0.03
Echinocereus viridiflorus Engelm	Y	8	0.02
Coryphantha missouriensis (Sweet) Britt & Rose	Y	7	0.02
Ulmus pumila L	N	2	0.01
Populus deltoides Marsh var occidentalis Rydb	Y	1	0

Note The total count based on all locations (n=12)

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Table 5 Successful and Non-successful Capture Location Habitat Types

HABITAT TYPES	SUCCESSFUL			NON-SUCCESSFUL		
	COVER %	NUMBER OF	MEAN	COVER %	NUMBER OF	MEAN
	HIGH	LOW	% COVER	HIGH	LOW	% COVER
wet meadow/marsh ecotone	12	12	1	12	15	45
tail marsh	5	5	1	35	5	20
persistent stream running	15	15	1	40	5	19
deciduous woodland	70	5	5	5	5	5
bottomland shrub	70	10	9	75	20	48
short upland shrub	70	5	8	90	5	52
mesic mixed grassland	45	15	3	65	65	5
reclaimed grassland	85	10	11	25	10	20
	SUM			SUM		
			39			32

Note Mean % Cover was determined by summing the % cover for all occurrences of a given habitat type and dividing by the number of occurrences

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30/31

TABLE 6 Supplementary Capture Location Information

SUCCESSFUL TRAP LOCATIONS																	
SAMPLE SITE	TRAP SITE	DATE	SUCCESS	HABITAT	COVER1	HABITAT2	COVER2	HABITAT3	COVER3	HABITAT4	COVER4	TREE CANOPY	SHRUB CANOPY	FOLIAR COVER	GROUND COVER	GRAMINOID COVER	FORB COVER
WBPI	D3#49	10/13/95	Y	210	55	110	25	220	10	324	10	25	80	20	5	5	5
WBPI	Z9541B#21	10/5/95	Y	210	70	324	10	322	15	220	5	0	75	80	5	20	5
WBPI	F2#22	10/5/95	Y	210	35	324	35	220	15	045	15	15	45	70	10	18	5
WBPI	Z9541B#25	10/5/95	Y	220	70	322	20	324	10	0	0	0	70	35	5	2	1
WBPI	H2	10/3/95	Y	322	45	220	45	210	10	0	0	0	55	80	10	20	20
WBPI	CC3	10/3/95	Y	324	71	030	5	210	12	110	12	12	12	95	5	20	2
WBPI	Z9542B#4	10/4/95	Y	324	85	220	15	0	0	0	0	0	15	70	5	15	2
WBPI	EE3#42	10/4/95	Y	324	75	210	25	0	0	0	0	12	25	75	15	10	3
WBPI	K3	10/4/95	Y	324	30	110	70	0	0	0	0	70	1	80	5	20	1
WBPI	J3#31	10/5/95	Y	324	65	210	20	220	10	110	5	5	30	55	10	10	3
WBPI	J3#37	10/5/95	Y	324	55	210	25	220	20	0	0	0	40	80	15	10	7
WBPI	Z9541B#31	10/5/95	Y	324	40	110	25	210	23	010	12	25	20	75	5	10	3
MEAN												14	39	68	8	13	5

NON-SUCCESSFUL TRAP LOCATIONS

SAMPLE SITE	TRAP SITE	DATE	SUCCESS	HABITAT	COVER1	HABITAT2	COVER2	HABITAT3	COVER3	HABITAT4	COVER4	TREE CANOPY	SHRUB CANOPY	FOLIAR COVER	GROUND COVER	GRAMINOID COVER	FORB COVER
WBPI	HH3	10/10/95	N	110	95	210	5	0	0	0	0	95	45	70	10	10	3
WBPI	E2	10/10/95	N	210	35	324	15	110	25	420	25	40	50	40	40	5	5
WBPI	I4	10/13/95	N	220	40	322	45	324	15	0	0	0	40	75	5	20	5
WBPI	E4	10/10/95	N	322	50	324	40	420	10	0	0	0	5	70	15	20	10
WBPI	DD4	10/10/95	N	322	75	324	20	220	5	0	0	0	5	80	5	20	10
WBPI	FF3	10/10/95	N	324	70	220	15	110	15	0	0	25	10	70	20	15	5
WBPI	G3	10/10/95	N	324	80	220	15	230	5	0	0	0	20	70	15	15	5
WBPI	C2	10/10/95	N	324	80	220	20	0	0	0	0	0	20	70	5	15	5
WBPI	AA3	10/5/95	N	324	75	420	25	0	0	0	0	0	0	70	30	5	1
WBPI	C9	10/5/95	N	324	90	220	10	0	0	0	0	0	10	70	5	15	5
WBPI	BB2	10/10/95	N	324	80	322	20	0	0	0	0	0	0	95	3	20	5
WBPI	A5	10/10/95	N	410	65	220	30	324	5	0	0	0	30	80	5	20	5
MEAN												13	20	72	13	15	5

10 = wet meadow/marsh ecotone
 30 = tall marsh
 45 = persistent stream running
 110 = deciduous woodland
 210 = bottomland shrub
 220 = short upland shrub
 230 = tall upland shrub

322 = mesic mixed grassland
 324 = reclaimed grassland
 410 = annual grass/forb
 420 = disturbed/barren land

Note The numbers beneath the dark lines are means of the column directly above it

TABLE 6 Supplementary Capture Location Information (cont.)

SUCCESSFUL TRAP LOCATIONS											
TRAPSITE	SUCCESS	SHRUB COVER	ROCK LITTER	DISTANCE TO CANOPY EDGE	TRAP POSITION	CANOPY SPECIES	SLOPE	ASPECT	MOISTURE	BURROW	SLOPE POSITION
D3449	Y	20	1	0	IN	SAEX1	5	18	M	MEDIUM	R
Z9541B#21	Y	20	1	0	IN	SAEX1	4	92	M	MEDIUM	B
F2#22	Y	20	5	0	IN	SAEX1	45	276	U	HIGH	R
Z9541B#25	Y	20	0	0	IN	SYOC1	12	67	M	LOW	B
H2	Y	20	3	0	OUT	SYOC1	12	136	M	MEDIUM	B
CC3	Y	4	5	4	OUT	SAEX1	3	16	M	LOW	R
Z9542B#4	Y	5	2	14	OUT	SAEX1	9	327	M	MEDIUM	B
EE3#42	Y	10	5	0	IN	SAEX1	4	293	M	MEDIUM	B
K3	Y	2	0	0	IN	PODE1	1	130	M	MEDIUM	B
J3#31	Y	7	0	3	OUT	SAEX1	2	32	M	MEDIUM	B
J3#37	Y	10	1	4	IN	SAEX1	1	92	M	MEDIUM	R
Z9541B#31	Y	3	1	2	OUT	SAEX1	7	336	U	HIGH	R
MEAN		12	2	2	IN=7 OUT=5	SAEX1=9 SYOC1=2 PODE1=1	9		MESOC=10 U=HUMID=2	LOW=2 MEDIUM=8 HIGH=2	BOTTOM=7 RIPARIAN=5
NON-SUCCESSFUL TRAP LOCATIONS											
TRAPSITE	SUCCESS	SHRUB COVER	ROCK LITTER	DISTANCE TO CANOPY EDGE	TRAP POSITION	CANOPY SPECIES	SLOPE	ASPECT	MOISTURE	BURROW	SLOPE POSITION
HH3	N	20	1	0	IN	PODE1	6	65	M	MEDIUM	B
E2	N	10	20	0	IN	SAEX1	3	318	U	HIGH	R
I4	N	15	1	5	OUT	PRV1	21	292	M	MEDIUM	M
E4	N	5	2	10	OUT	SAEX1	45	36	M	MEDIUM	M
DD4	N	5	1	10	OUT	SAEX1	16	314	M	LOW	M
FF3	N	5	10	6	OUT	SAEX1	6	932	M	LOW	B
G3	N	10	15	3	OUT	PRV1	4	16	M	LOW	B
C2	N	10	0	10	OUT	SAAM1	22	67	M	LOW	M
AA3	N	0	10	18	OUT	SAEX1	6	69	M	LOW	R
C9	N	5	15	21	OUT	PRV1	14	148	M	LOW	M
BB2	N	0	0	17	OUT	SAEX1	15	117	M	LOW	M
A5	N	15	5	25	OUT	SAEX1	26	306	M	LOW	M
MEAN		8	7	10	IN=2 OUT=10	SAEX1=7 PRV1=3 PODE1=1 SAAM1=1	16		MESOC=11 U=HUMID=1	LOW=8 MEDIUM=3 HIGH=1	MIDDLE=7 BOTTOM=3 RIPARIAN=2

Note The numbers beneath the dark lines are means of the column directly above it except for the cases where a list is present which records the number of observations for each category

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Table 7 Non-Successful Locations Plant Species List.

Scientific Name	Native	Occurrence	Frequency
<i>Achillea millefolium</i> L. ssp <i>lanulosa</i> (Nutt.) Piper	Y	1	0 08
<i>Agropyron cristatum</i> (L.) Gaertn	N	5	0 42
<i>Agropyron repens</i> (L.) Beauv	N	1	0 08
<i>Agropyron smithii</i> Rydb	Y	8	0 67
<i>Agrostis stolonifera</i> L	N	1	0 08
<i>Alyssum minus</i> (L.) Rothmaler	N	4	0 33
<i>Ambrosia psilostachya</i> DC	Y	5	0 42
<i>Aristida purpurea</i> Nutt. var <i>robusta</i> (Merrill) Holmgren & Holmgren	Y	1	0 08
<i>Artemisia dracunculoides</i> L.	Y	1	0 08
<i>Artemisia frigida</i> Willd	Y	5	0 42
<i>Artemisia ludoviciana</i> Nutt	Y	4	0 33
<i>Asclepias speciosa</i> Torr	Y	2	0 17
<i>Aster encoides</i> L	Y	8	0 67
<i>Astragalus drummondii</i> Dougl. ex Hook	Y	2	0 17
<i>Astragalus flexuosus</i> (Hook.) G. Don	Y	3	0 25
<i>Barbarea orthoceras</i> Ledeb	N	3	0 25
<i>Bouteloua curtipendula</i> (Michx.) Torr	Y	1	0 08
<i>Bouteloua gracilis</i> (H. B. K.) Lag. ex Griffiths	Y	1	0 08
<i>Bromus inermis</i> Leyss	N	12	1
<i>Bromus japonicus</i> Thunb. ex Murr	N	7	0 58
<i>Buchloe dactyloides</i> (Nutt.) Engelm	Y	2	0 17
<i>Calochortus gunnisonii</i> Wats	Y	1	0 08
<i>Camelina microcarpa</i> Andr.	N	4	0 33
<i>Carduus nutans</i> L.	N	5	0 42
<i>Carex heliophila</i> Mack	Y	4	0 33
<i>Ceratophyllum demersum</i> L.	Y	1	0 08
<i>Chenopodium leptophyllum</i> Nutt. ex Moq	Y	1	0 08
<i>Chrysopsis fulcrata</i> Greene	Y	4	0 33
<i>Chrysopsis villosa</i> Pursh	Y	3	0 25
<i>Cirsium arvense</i> (L.) Scop	N	11	0 92
<i>Coryphantha missouriensis</i> (Sweet) Britt. & Rose	Y	1	0 08
<i>Descurainia pinnata</i> (Walt.) Britt.	Y	1	0 08
<i>Descurainia richardsonii</i> (Sweet) Schultz	Y	2	0 17
<i>Echinocereus viridiflorus</i> Engelm	Y	2	0 17
<i>Epilobium ciliatum</i> Raf	Y	1	0 08
<i>Eriogonum alatum</i> Torr	Y	2	0 17
<i>Galium aparine</i> L.	Y	3	0 25
<i>Gaura coccinea</i> Pursh	Y	2	0 17
<i>Glycyrrhiza lepidota</i> Pursh	Y	2	0 17
<i>Grindelia squarrosa</i> (Pursh.) Dun	Y	3	0 25
<i>Gutierrezia sarothrae</i> (Pursh.) Britt. & Rusby	Y	4	0 33
<i>Koeleria pyramidata</i> (Lam.) Beauv	Y	6	0 5
<i>Kuhnia eupatorioides</i> L.	Y	2	0 17
<i>Lactuca serriola</i> L.	N	4	0 33
<i>Lathyrus eucosmus</i> Butters and St. John	Y	8	0 67
<i>Liatris punctata</i> Hook	Y	2	0 17
<i>Linum dalmaticum</i> (L.) Mill	N	9	0 75
<i>Linum perenne</i> L. var <i>lewisii</i> (Pursh.) Eat. & Wnght	Y	3	0 25
<i>Melilotus officinalis</i> (L.) Pall	N	5	0 42

Frequency = # of occurrences/12

Highlighted scientific names are species only occurring at non successful locations

Table 7 Non-Successful Locations Plant Species List (cont.)

Scientific Name	Native	Occurance	Frequency
<i>Nepeta catara</i> L.	N	1	0.08
<i>Oenothera biennis</i> L.	Y	1	0.08
<i>Oenothera brachycarpa</i> Gray	Y	2	0.17
<i>Opuntia humifusa</i> (Raf.) Raf.	Y	7	0.58
<i>Phleum pratense</i> L.	N	1	0.08
<i>Poa compressa</i> L.	N	4	0.33
<i>Poa pratensis</i> L.	N	1	0.08
<i>Polygonum convolvulus</i> L.	N	1	0.08
<i>Polygonum sawatchense</i> Small	Y	2	0.17
<i>Populus deltoides</i> Marsh var <i>occidentalis</i> Rydb.	Y	1	0.08
<i>Prunus virginiana</i> L.	Y	1	0.08
<i>Psoralea tenuiflora</i> Pursh	Y	6	0.5
<i>Ribes odoratum</i> Wendl.	Y	1	0.08
<i>Rosa arkansana</i> Porter	Y	7	0.58
<i>Salix exigua</i> Nutt. ssp. <i>intenor</i> (Rowlee) Cronq.	Y	2	0.17
<i>Solidago missouriensis</i> Nutt.	Y	8	0.67
<i>Stipa comata</i> Trin. & Rupr.	Y	1	0.08
<i>Stipa viridula</i> Trin.	Y	1	0.08
<i>Symphoricarpos occidentalis</i> Hook.	Y	10	0.83
<i>Taraxacum officinale</i> Weber	N	1	0.08
<i>Tragopogon dubius</i> Scop.	N	2	0.17
<i>Ulmus pumila</i> L.	N	1	0.08
<i>Verbascum thapsus</i> L.	N	4	0.33
<i>Vicia americana</i> Muhl. ex Willd.	Y	3	0.25

Frequency = # of occurrences/12

Highlighted scientific names are species only occurring at non-successful locations

Data Summary of Non-Successful Location Plant Species

species = 73

% native species = 70

of species found only at non-successful locations = 27

See highlighted scientific name for these individuals in the list

TABLE 8 ADJUSTED TRAPPING RESULTS DURING THE FIRST WEEK OF TRAPPING AND THE WEEK AFTER AFTER SAND/ROCK BLANKET CONSTRUCTION, B-4 POND DAM SLOPE 1995

	Pre-Construction		Post Construction	
	Riparian Area Only		Riparian Area Only	
Trap Nights	Raw Data	Adjusted Data	Raw Data	Adjusted Data
	292	200	176	200
Species Richness	5		5	
Species Captured				
<i>Reithrodontomys megalotis</i>	3	2	0	0
<i>Peromyscus maniculatus</i>	41	28	14	16
<i>Microtus pennsylvanicus</i>	62	42	22	25
<i>Microtus ochrogaster</i>	3	2	17	19
<i>Chaetodipus hispidus</i>	0	0	1	1
<i>Zapus hudsonius</i>	7	5	4	5

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• **APPENDIX A**

**CHRONOLOGICAL HISTORY FILE OF THE DAM TOE SLOPE
SAND/ROCK BLANKET STUDY - PREBLE'S MEADOW
JUMPING MOUSE CONCERNS**

- August 9, 1994 The Biodiversity Legal Foundation petitioned the U S Fish and Wildlife Service (USFWS) to list the Preble's Meadow Jumping Mouse as threatened or endangered
- October 11, 1994 Letter 94RF10265 from P A Lee to C L Row, DOE, RFFO confirmed guidance from DOE, RFFO received in a meeting held September 29, 1994 This guidance was that Ecology and Watershed Management's ecology professionals should continue to determine if projects in Preble's Meadow Jumping Mouse habitat should go forward, until or unless DOE, RFFO issued a policy directing otherwise
- January 26, 1995 First site visit from USFWS to inspect blanket project locations - no letter record
- February 27, 1995 The 90 Day Finding regarding the Preble's Meadow Jumping Mouse was published by the USFWS The finding was that the petition "had merit", and that the mouse should be studied further for inclusion in the threatened and endangered species list
- March 8, 1995 Second site visit from USFWS, blanket project locations were inspected and monitoring recommendations were discussed - no letter record
- March 24, 1995 A letter to M Silverman from L W Carlson (USFWS) provided comments and recommendations on the proposed sand/rock blanket project A number of survey and monitoring requirements were laid out in this letter
- April 4, 1995 The study plan for the "Dam Toe Slope Sand/Rock Blanket Study" was completed by EG&G and transmitted to DOE
- April 24, 1995 A letter from C L Row to B Garza transmitted the "Dam Toe Slope Sand/Rock Blanket Study" Plan to the USFWS The letter stated that the anticipated start for the project was June 1, 1995
- May 10, 1995 A letter from D A Brockman (DOE) to L W Carlson confirmed that DOE would carry out verbal agreements made with B Garza regarding monitoring impacts from sand/rock blanket construction on the Preble's Meadow Jumping Mouse

May 31, 1995 Initial small mammal trapping began at the B-2 dam site

August 29, 1995 B-4 dam monitoring study began

September 1, 1995 A memorandum from K Motyl (RMRS) to L E Woods (K-H) formally transmitted a request from C Row and G Hill that ecology personnel continue trapping of Preble's meadow jumping mice throughout the sand/rock blanket installation project. Additionally, B Garza had made the USFWS request of K Motyl that he have ecologists perform fluorescent dye tracking of the mice to determine locations of burrows. This memo cited the start date for the project as September 13, 1995. Ground breaking began on September 19, 1995.

October 13, 1995 The final on-site inspection for "Acceptance and Transfer" of the project was conducted on 13 October, 1995.